SOLAR SYSTEM EXPLORATION

NEWSLETTER

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Scientific Foundations Guide Programmatic Decisions For Future Years

by Dr. Carl Pilcher

Science Director for Solar System Exploration, NASA Office of Space Science

There have been exciting developments in solar system exploration since the last newsletter in April. The announcement of evidence for recent water seepage on Mars in the work of Mike Malin and Ken Edgett attracted worldwide attention. The Mars Global Surveyor images on which this impressive work is based show gullies and debris aprons which, had they been seen on Earth, would have been immediately and without question interpreted as the product of flowing water. But it had been long thought that conditions on Mars would not have allowed surface water flow as recently as the newly discovered features indicate (a few million years ago at most, and perhaps much less). Could Mars have some other unknown process that mimics the action of water on Earth, or has Mars figured out how to maintain liquid water close enough to the surface that it periodically gushes forth, streaming down cliff faces and crater walls? Check out the paper in the June 30 issue of *Science* and see the images, and tens of thousands more, at http://www.msss.com/mars_images/.

The NEAR Shoemaker mission has continued to return spectacular images and other data on the Earth-approaching asteroid Eros. The mission has revealed Eros to be a primitive body, perhaps dating back to the formation of the solar system, yet oddly complex, for example in the evidence for extensive layering that might have been formed when Eros was part of a larger parent body. See the data and science interpre-

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While enjoying the rewards of the program, we continue to deal with its challenges.

Reviewing NASA's Space Science Research and Analysis Programs

by Dr. Guenter Riegler

Director, Research Program Management, NASA Office of Space Science

Attainment of the long-range strategic goals of NASA's Office of Space Science (OSS) requires a constant interplay among theory, technology and instrument development, suborbital test, and analysis of data from space science missions. These goals are enabled in large measure through the Research and Analysis (R&A, often referred to as Supporting Research and Technology-SR&T) programs, consisting of a broad portfolio of space science activities that provide a variety of types of input critical to the achievement of OSS goals. OSS has recently regrouped the R&A program elements and will institute a triennial review of the R&A programs.

Overview of NASA's Space Science R&A Program

NASA's Space Science R&A programs support more than 2,000 awards for a total

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tations at http://near.jhuapl.edu/. Note that this website, the Mars image site, and those for all other solar system exploration missions can be reached through the Solar System Exploration homepage at http://sse.jpl.nasa.gov/. Just click on Missions, http://sse.jpl.nasa.gov/missions/missions.html then on the solar system body you're interested in, and finally on the specific mission.

While we've been enjoying these rewards of the program, we've continued to deal with its challenges. The reappraisal of the Mars Program that Dan McCleese and I discussed in the last newsletter is continuing. In addition to completing preparations to launch the 2001 orbiter, we have made a decision on what spacecraft we will plan to launch to Mars at the 2003 opportunity. The two candidates were an Athena-class rover delivered with a Mars Pathfinder airbag system, and a science/communications orbiter that would recover the lost Mars Climate Orbiter investigations and carry a visible/near-infrared imaging spectrometer, a high-resolution camera, and possibly other science instruments as well. The choice was the Athena rover, and we are considering the possibility of flying two identical rovers in 2003. A decision on that will be announced shortly.

Dr. Carl Pilcher is the Science Director of the Solar System Exploration theme for the NASA Office of Space Science.

Replanning the Mars Program beyond the 2003 launch opportunities is in an information-gathering phase. Formal mechanisms have been put into place to solicit ideas and approaches from U.S. industry, NASA Centers, and current and potential international partners. Input from the broader community has been sought through a Workshop at the Lunar and Planetary Institute in Houston. All of the information gathered will be synthesized in a process organized by the Mars Program Executive Committee chaired by Earle Huckins, the Deputy Associate Administrator for Space Science (see Dan McCleese's column in the last newsletter; Earle will soon hand over the chair to Scott Hubbard, the new Mars Program Director). This will lead to a new draft Mars Program Plan, which should be available for review in October.

I have been paying a lot of attention to the Outer Planets Program as well as to Mars. Two big challenges for outer solar system missions are launchers and power sources. All three current missions–the Europa Obiter, Pluto/Kuiper Express, and Solar Probe–are planned to be launched on one of a new series of Atlas or Delta rockets. Because these vehicles have not yet completed development and flight qualification, there is some risk that they may not be ready by the time we need them. In addition, the budget put in place several years ago to procure these launch services is substantially less than the cost we now expect.

With respect to power sources, although NASA is looking at different options for these missions, it appears so far that radioisotope power is the most technically viable. For this type of power source, the challenge is to develop a system that can transform the thermal energy of radioactive decay into electrical power with much greater efficiency than the thermoelectric generators used on Voyager, Galileo, Cassini, and a host of other missions. The technology to achieve this higher efficiency has proven more difficult and expensive to develop than anticipated, and operational systems will not be ready as soon as originally thought.

The net result, including the effects of other factors, is missions that are growing in cost and being delayed from original schedules. This may mean there are difficult choices ahead. At the same time, I've concluded that we could do a better job of developing the scientific foundation for other programmatic decisions we may have to make in outer solar system exploration in the coming years. For example, how can we best prepare to respond to exciting and spectacular scientific results at Titan when the Cassini-Huygens mission reaches the Saturn system in 2004? What if the tides of Europa, as measured by the Europa Orbiter, are not the 30 meters expected for a global ocean or the 1 meter expected for solid ice and rock, but something in between? When is the right time to phase the high-priority comet nucleus sample return mission into our ongoing series of comet missions? I have asked Jay Bergstralh to lead a small team of NASA and community scientists to address these and other interrelated questions. Their report, which should be completed by September, will provide an important part of the foundation for future decisions.

Another thing that concerns me is the public visibility of solar system exploration. Now, you may think "That's odd; the public visibility of solar system exploration is great!" But I think it could be greater still. For example, very few people have been aware that we have a fabulous mission in orbit around Mars returning stupendous data. The recent discovery discussed above has helped to change that, but it illustrates that we need to capitalize better on the steady stream of discoveries from our missions and other research. To do this, the science community and NASA Headquarters must work in close partnership. What we ask of you, the individual scientist, is to contact us when you are preparing a

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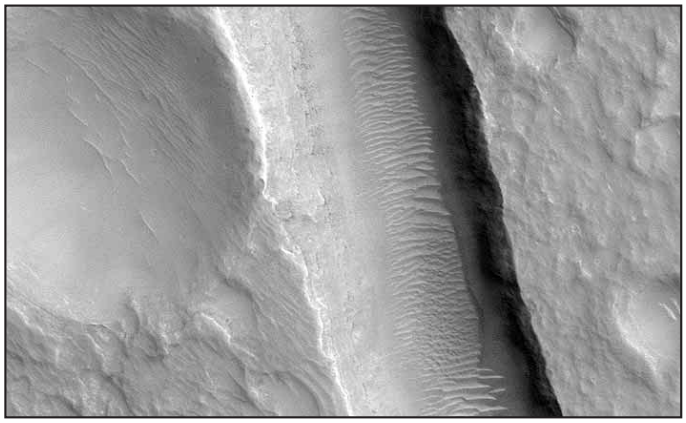
research paper reporting a major discovery. We can then work with you, your organization's public affairs office, the NASA Public Affairs Office, and other groups such as the Solar System Visualization Group at JPL to ensure the widest and most effective press coverage of your discovery. The right person to contact at NASA HQ is the appropriate Program or Discipline Scientist; and if you're unsure you can always contact me directly.

Speaking of the Discipline Scientists, another area of long-term concern is the programs they manage, generally called the Research and Analysis (R&A) Programs in "NASA speak." These Programs (and their current managers), include Planetary Atmospheres (Denis Bogan), Planetary Geology and Geophysics (John Grant, soon to be replaced by Dave Senske), Cosmochemistry (Joe Boyce), and Planetary Astronomy (Tom Morgan). In contrast to the Astrophysics Program, in which robust and broadly defined data analysis (DA) programs aimed at the general community have been associated with individual flight missions, in solar system exploration we historically tended to rely more on these Discipline Programs for general community support including some elements of data analysis. This difference developed in part because solar system exploration missions differed from astrophysics missions in being less frequent and returning data episodically (e.g., from planetary flybys) rather than continuously. Relying heavily on data analysis programs tied to individual missions or periods of data return would therefore have tended to lead to variability in funding to the community. In contrast, today we have a steady stream of solar system exploration missions and data return, and data analysis programs tied to missions can provide much more continuous support than they did in the past.

Another aspect of this issue is the relative ease of increasing DA funding compared to increasing R&A. Increasing DA funding is entirely within the purview of the Office of Space Science (OSS), and requires only that we make the normal trades between different elements of our budgets. Increasing R&A funding, in contrast, is a complex process involving negotiations with many people outside of OSS. We have been successful in this process, most notably in getting the Astrobiology Program (managed by Mike Meyer), which supports a number of solar system exploration investigators, added to R&A. While we continue to seek similar R&A augmentations and further increases to Astrobiology, we are beginning to systematically increase mission DA funding across the solar system exploration program. To the degree that R&A programs fund some data analysis, this will relieve pressure on those programs, allowing them to focus more strongly on general research in support of missions. To the degree that we can broaden DA programs to support some research that has heretofore been principally supported under R&A, we can increase the funding opportunities available to those who have traditionally relied on the R&A programs.

The R&A Programs are only one area of community concern that has been brought to my attention. I know there are many others as well. One of the mechanisms we have for bringing these concerns to NASA's attention is the NASA advisory committees. At the top of the pyramid is the NASA Advisory Council (NAC) which advises the Administrator. Reporting to the NAC are several more specific advisory committees whose Chairs are members of the NAC. One of these is the Space Science Advisory Committee (SSAC) which advises the Space Science Associate Administrator Ed Weiler. The current Chair of the SSAC is our own Steve Squyres. The SSAC in turn has four subcommittees, one of which is the Solar System Exploration Subcommittee (SSES) chaired by Mike Drake. The SSES directly advises me. The solar system members of the SSAC and all members of the SSES represent you, the solar system exploration community, to NASA. You can find current membership lists for these committees at http://spacescience.nasa.gov/advisory.htm. Please feel free to contact any of these members to raise concerns and issues that they can in turn raise at committee meetings.



A shallow crater is seen adjacent to one of the troughs of the Sirenum Fossae. The area shown is 1.1 km wide by 2.3 km long.

NASA/JPL/MSSS

I would like to close on a personal note. As many of you know, I will be on a "mini-sabbatical" from September 1 until February 1, 2001, teaching space policy at Princeton University's Woodrow Wilson School of Public and International Affairs. During my absence, Jay Bergstralh will be the Acting Science Director for Solar System Exploration. Jim Garvin, who as Mars Exploration Program Scientist is effectively, but unofficially, the Deputy Science Director for Mars, will continue to serve in that capacity while Jay is Acting. I am confident that Jay and Jim can count on your support, as I do.

With best wishes,
Carl

Riegler – Cont. from Page 1

of about $210M in Fiscal Year 2000 (FY00). Activities supported by the programs range from theory and modeling, through laboratory-based research, to the development and validation of new instruments. Other than for suborbital investigations, however, the R&A programs do not develop flight hardware.

Until recently the OSS R&A programs consisted of roughly 40 separate program elements distributed across the disciplines of astrophysics, space physics, and planetary research. As a step towards clarifying the role of the various R&A program elements, the previous set of 40 individual R&A elements and their current resources have recently been grouped into 9 science "clusters" (see Table 1), each consisting of related science or functional programs and managed by the Discipline Scientists in NASA's OSS Research Division.

To ensure that the R&A programs are making the most effective possible contribution to the OSS goals, selection priorities for individual R&A subdisciplines will be more explicitly determined by the relevance to the goals and objectives identified in the Space Science Enterprise Strategic Plan (http://spacescience.nasa.gov/strategy/1997/sseplan.htm).

Table 1: Science Cluster Names and Program Content

Cross-Theme Theory and Data Analysis Programs	(a) Sun-Earth Connection (SEC) Theory Program, SEC Guest Investigator Program; (b) Astrophysics Theory Program, Astrophysics Data Program, Long-Term Space Astrophysics Research Program
Solar and Heliospheric Sciences	Heliospheric Physics, Solar Physics SR&T, Solar Low Cost Access to Space
Geospace Sciences	Magnetospheric Physics; Ionospheric, Thermospheric, Mesospheric Physics; Geospace Low Cost Access to Space
Origin and Evolution of Solar System Bodies	Cosmochemistry, Planetary Geology and Geophysics, Origins of Solar Systems, Mars Data Analysis Program (DAP), Lunar DAP
Planetary Systems Science	Planetary Astronomy, Near-Earth Objects, Planetary Atmospheres incl. Suborbital Research, Observatory Support, Jupiter DAP
Astrobiology and Planetary Instrumentation	Exobiology, Astrobiology, Planetary Instrument Definition, Planetary Instrument Upgrade, Planetary Protection
Astrophysics	Infrared/Radio/Interferometry Astronomy; UV/Visible Astrophysics; Space Astrophysics Detectors, Astrophysics Suborbital Research
High Energy Astrophysics	X-Ray, Gamma-Ray, Cosmic Ray, and Gravitational Astrophysics (incl. instrumentation, laboratory and suborbital research)
Information Systems	Applied Information System Research

An active volcanic eruption on Jupiter's moon Io (along the Tvashtar Catena chain of giant volcanic calderas) was imaged on February 22, 2000 by the Galileo spacecraft. NASA/JPL

Review Process

As a further step, OSS will convene a series of reviews, called the "R&A Senior Reviews." The first review will be held in June or July 2001. Further reviews will follow at three-year intervals. At these reviews, reports on each cluster will describe the content of the cluster, its relevance to the goals in the most recent Space Science Enterprise Strategic Plan, highlights of a few recent significant accomplishments, and previews of ongoing efforts. These reports will be reviewed by a panel of active researchers with recent research efforts in two or more of the science clusters, who will have been selected for their breadth and impartiality, rather than as advocates for any specific R&A cluster. Panel members will be asked to address three questions:

(1) is the current science cluster structure optimal for attaining the long-term strategic goals of the Space Science Enterprise? Are cross-disciplinary research areas adequately accessible?

(2) what is the science quality and productivity of each science cluster, and to what degree does each cluster support or enable the strategic goals and objectives of the Space Science Enterprise?, and

(3) judging by the priorities in the strategic plan, is the current funding distribution across the nine science clusters the optimum one, or would the review panel recommend changes?

OSS will take the recommendations of the Senior Review panel into account in determining the changes, if any, to be made in the R&A programs structure, and in formulating budget plans for the R&A programs for Fiscal Year 2002 and beyond.

Using a combination of the usual annual reviews of a portion of each program element, and this new triennial review of the overall R&A programs, OSS expects to maintain productive R&A programs that are at the same time clearly focused on and responsive to the strategic goals and objectives of the Space Science Enterprise.

Discipline Scientists at NASA HQ

Jay Bergstralh

Discipline Scientist, Planetary Atmospheres

Jay Bergstralh earned his Ph.D. in Astronomy in 1972 from the University of Texas/Austin. He went from there to JPL, first as a National Research Council post-doc for two years and then as an employee. Jay's research interests focused on radiative transfer in the cloudy atmospheres of the giant planets, comprising both spectroscopic observations and modeling. During his career at JPL, Dr. Bergstralh was associated with the Voyager project and the International Halley Watch. He was Chair of the AAS Division for Planetary Sciences in 1986-87 and co-editor of the book *Uranus* (1991; University of Arizona Press).

In 1988, Dr. Bergstralh was detailed to NASA Headquarters to be Discipline Scientist for Planetary Atmospheres. He became a career Civil Service employee at NASA in 1992. Since that time he has held responsibilities including Program Manager for the Planetary Data System, Program Scientist for Galileo, Discovery, Cassini, and Europa Orbiter, and Program Manager for NASA-Keck and IRTF.

Bruce Betts

Discipline Scientist, Planetary Instrument Definition and Development Program (PIDDP)

Bruce Betts also participates in program scientist activities in the Mars program, including having been Program Scientist for the Mars Airplane. He has been at NASA Headquarters since July 1998, and will be there until June 2001. He is on temporary assignment from the San Juan Capistrano Research Institute, where he pursues planetary surfaces research, particularly thermal IR and visible studies of Mars, laboratory infrared studies related to the Moon and Galilean satellites, and some radio science. He also has led a number of education activities there including CD-ROM development and hands on programs, and was Division Manager of the San Juan Division. He earned a Ph.D. from Caltech in Planetary Science with a minor in Geology, and from Stanford earned an M.S.

Denis Bogan

Discipline Scientist, Planetary Atmospheres and Jovian System Data Analysis Programs

Denis J. Bogan took over the role of discipline scientist for the Planetary Atmospheres and Jovian System Data Analysis programs at NASA Headquarters in December 1999. He is now also program scientist of the Galileo and Pluto/Kuiper Express missions. He previously served as program scientist for the Planetary Atmospheres program in 1995-96. Dr. Bogan's career spans research in government laboratories (NRL and NASA/GSFC), academia (Catholic University), and research management (NASA HQ). He received the A.B. degree in chemistry from Northeastern University and the Ph.D. in physical chemistry, in 1973, from Carnegie Mellon University. His research interests include terrestrial and planetary atmospheres, combustion, chemiluminescence, chemical oscillators and deterministic chaos.

Joseph Boyce

Discipline Scientist, Cosmochemistry

Joseph Boyce also administers the Origins of Solar Systems, Lunar Data Analysis, and Mars Data Analysis Programs. He came to NASA Headquarters in 1977 from the U.S. Geological Survey in Flagstaff where he had worked for 8 years. He has held numerous positions at NASA.

Mike Meyer

Discipline Scientist, Astrobiology

Mike Meyer is Discipline Scientist for Astrobiology. This new Program, started in 1997, is dedicated to the study of the life in the universe. Dr. Meyer is also the Program Scientist for the Mars '01 Mission.

Dr. Meyer has managed NASA's Exobiology Program since 1993, and from 1994 to 1997, Dr. Meyer was also the Planetary Protection Officer for NASA. Dr. Meyer has been the Program Scientist for the Mars Microprobe mission and for two Phase I Shuttle/Mir experiments (Mir Sample Return Experiment and the Particle Impact Experiment). Dr. Meyer was detailed from the Desert Research Institute, University of Nevada, where he was an assistant research professor from 1989-97. From 1985 to 1989, he served as associ-

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ate director and associate in research for the Polar Desert Research Center, Department of Biological Science, Florida State University. In 1982, he was a visiting research scientist at the Culture Centre for Algae and Protozoa in Cambridge, England.

Dr. Meyer's research interest is in microorganisms living in extreme environments, particularly the physical factors controlling microbial growth and survival. He has conducted field research in the Gobi Desert of Mongolia (joint U.S./Russian/Mongolian expedition to study cyanobacteria living under rocks, 1991), Siberia (study of microorganisms living in ancient permafrost, 1990/91), and the Canadian Arctic (factors controlling ice cover, Colour Lake, Axel Heiberg Island, Northwest Territories, 1990). He is also a veteran of six research expeditions to Antarctica, to study cryptoendolithic microbial ecosystems in the dry valleys (1985/87), investigate krill-phytoplankton relations (1978/81), and research primary productivity in the Weddell Sea (1977). His experience also includes two summers working as a treasure salvager off the coasts of Florida and North Carolina.

Dr. Meyer earned his M.S. and Ph.D. in oceanography from Texas A&M University (1981 and 1985) and his B.S. in biology from Rensselaer Polytechnic Institute (1974) in Applied Physics (emphasis Astronomy) and a double major B.S. in Physics and Mathematics.

Thomas Morgan

Discipline Scientist, Planetary Astronomy

Tom Morgan also manages the Near Earth Objects Observation program and serves as program scientist on all of NASA's minor planet missions. A physicist, astronomer, and planetary scientist, his current research interests include physical studies of minor planets with emphasis on possible highly evolved comet nuclei among the Near Earth Object Population and on the exospheres of the Moon and Mercury. Dr. Morgan joined NASA in 1997; prior to that he was a National Research Council Postdoctoral Fellow; Assistant Professor of Physics at Houston Baptist University; Chairman of the Physics Department at Southwestern University; a NASA/NRC Senior Research Fellow Resident and Research Management Associate at Johnson Space Center; a Visiting Senior Scientist, at NASA Headquarters; and a Senior Research Scientist at Southwest Research Institute. Dr. Morgan has been a guest observer for NASA on the IUE and Copernicus satellites as well as at most of the major national observatories including NASA/Infrared Telescope Facility, the National Solar Observatory, and the National Optical Astronomy Observatories. He received his B.S. and Ph.D. degrees from the University of Florida.

David Senske

Discipline Scientist, Planetary Geology and Geophysics

Dave is the incoming Discipline Scientist for the Planetary Geology and Geophysics. He received his undergraduate degree in geophysics from the University of Arizona in 1984 and his M.S. and Ph.D. in Planetary Geosciences from Brown Univer-sity in 1989 and 1992 respectively. His dissertation concentrated on analyzing the geology of volcanic highlands on Venus using Earth-based and Magellan radar data. He has also worked in the field of marine geology at the United States Geological Survey office of Atlantic Marine Geology and the Woods Hole Oceanographic Institution where he studied the stratigraphy of deep ocean sediments. Dr. Senske has spent the last seven years as a scientist at the Jet Propulsion Laboratory where he has worked on the Magellen Mission to Venus, the Galileo mission to Jupiter and the Mars Polar Lander Project. His research interests include the geologic and geophysical analysis of remote sensing data of Venus, Mars and the Galilean Satellites.

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Report from the Office of Space Science (OSS):
NASA–University Relations

by Dr. Guenter Riegler
Director, Research Program Management, NASA Office of Space Science

NASA is currently conducting a study of NASA-University cooperation, with an emphasis on areas for increased cooperation. Some of the patterns and facts compiled for this study may be of interest to the space science community, and are hereby offered to the reader.

Types of NASA-University Cooperation

Broadly speaking, there are three avenues for NASA-University Cooperation in NASA's Office of Space Science (OSS):

(1) Hardware Development Programs for Flight Missions: This avenue consists of providing instruments or whole missions. Opportunities are as frequent as once per 18 months for certain mission "lines"; typical award duration is 5 to 10 years. To be successful, proposers require highly specialized, world-class expertise; oversubscription is as high as 20: 1.

(2) Data Analysis (DA) Programs for Flight Missions: Annual, fully open investigation cycles invite proposals for new science observations as well as data analysis for past observations. Most awards have 1-year duration. Data analysis programs have been well established in Astrophysics missions, and OSS is now systematically adding similar DA programs to planetary and other space science missions, even for missions that were selected in "Principal Investigator Mode". DA programs are the best opportunity for "new" entrants to be selected for funding; oversubscription ranges from 1.5: 1 to 6: 1.

(3) Research and Analysis (R&A, often referred to as Supporting Research and Technology-SR&T) Programs: This avenue consists of laboratory research, theory, detector and instrument development, and sub-orbital test flights on rockets, balloons, and aircraft. OSS issues annual calls for proposals; typical award duration is 3 years; oversubscription typically ranges from 3: 1 to 5: 1.

Current Support to Universities

In FY2000, OSS support for flight mission development (see (1) above) is budgeted at $1,849M, of which about $210M flows to universities. Avenue (2) is budgeted at $154M, of which about $90M reaches universities. Finally, R&A (avenue 3) is budgeted at $190M, with a university component of about $100M. All university figures are approximate since not all decisions have been finalized, but the university percentages are assumed to be roughly equal to those of recent years. OSS support for universities at about $400M represents about 40% of NASA's total support to universities.

Future Funding Plans

For the next five years, much of the growth in the OSS program is, again, concentrated on new and more capable flight missions. However, OSS plans also include growth in the research and data analysis programs (R&DA, the combination of items 2 and 3 above). New R&A augmentations have been submitted as part of new science initiatives, e.g. for the "Living with a Star" (http://sec.gsfc.nasa.gov/lws.htm) initiative, and for the Astrobiology research augmentation. Furthermore, OSS is systematically adding new DA programs to missions – including PI-class missions – which did not have them before, and enhancing existing DA programs, e.g. for planetary missions.

As a result of these changes and augmentations, the portion of the OSS budget plan most accessible to the university community, namely the R&DA programs, will grow from $344M in FY2000 to $506M in FY2005. This represents an annual growth rate of 8% - much more rapid than a projected inflation rate of about 3%!

Conclusion

The figures above for current budgets and OSS's plans show a strong, tangible plan for increased support for R&DA. Given that OSS is committed to fully open, peer-review-based selections, this represents a strong commitment to increasing support to university-based R&DA.

Dr. Guenter Riegler
Director, Research Program Management Division, NASA Office of Space Science

Dr. Riegler joined NASA Headquarters in 1987 as a detailee from the Jet Propulsion Laboratory, responsible for Astrophysics Mission Operations and Data Analysis programs. From 1995 to 1999, he was the Chief Scientist for the Research Division of the Office of Space Science, and also assumed responsibility for mission operations and data analysis management for most operating space science missions. Dr. Riegler was appointed Director of the Research Program Management Division in NASA's Office of Space Science in February 1999.

Prior to that time, Dr. Riegler was a member of the Technical Staff at the Jet Propulsion Laboratory (1975-1987), Group Supervisor for the Space Science Group at Bendix Aerospace (1971-1975), and Postdoctoral Fellow at the California Institute of Technology (1969-1971). He completed his undergraduate dissertation on x-ray instrumentation in 1964 at the Vienna Institute of Technology, Austria and then earned his Ph.D. at the University of Maryland in 1969, working at the Goddard Space Flight Center in the (then) new field of X-ray Astrophysics.

More on Education and Public Outreach for Planetary Scientists

by Dr. Ellis D. Miner
Co-Director, NASA Solar System Exploration Education and Public Outreach Forum

In an effort to be of greater service to the planetary science community, the Solar System Exploration EPO Forum plans to have a booth at the October meeting of the Division for Planetary Sciences (DPS) in Pasadena. Leslie Lowes and I (along with other colleagues from the NASA Office of Space Science EPO support network) will try to answer any questions any of you may have about the services available to you. We will also try to introduce you to other contacts in the support network. They can help you to formulate education and public outreach projects, suggest potential partners, create appropriate partnerships within their geographic regions, and organize training workshops for interested scientists. Regional Brokers/Facilitators work with scientists in all four science themes within NASA's Office of Space Science: Astronomical Search for Origins and Planetary Systems, Structure and Evolution of the Universe, Solar System Exploration, and Sun-Earth Connection. More about this organization can be found at http://spacescience.nasa.gov/education/ecosystem.htm.

The Broker/Facilitator for the northwestern states (AK, WA, OR, ID, MT, WY, northern CA, NV, UT, CO, and parts of AZ and NM) is Space Science Institute in Boulder, CO. The point of contact is Cheri Morrow (303-492-7321; email: camorrow@colorado.edu).

The Broker/Facilitator for the south and lower midwest region (ND, SD, NE, KS, OK. TX, HI, southern CA, and parts of NM, AZ, and LA) is the Lunar and Planetary Institute in Houston, TX. The point of contact is Kathleen Johnson (281-244-2014; email: johnson@ lpi.usra.edu).

The Broker/Facilitator for the upper midwest region (MN, WI, IA, IL, IN, and MO) is DePaul University in Chicago, IL. The point of contact is Lynn Narasimhan (773-325-1854; email: cnarasim@condor.depaul.edu).

The Broker/Facilitator for the southeastern states (AR, KY, TN, MS, AL, MD. DE, DC, VA, NC, SC, GA, FL, Puerto Rico, and parts of LA) is South East Regional Clearing House in Charleston, SC. The point of contact is Cassandra Coombs (843-953-5437; email: coombsc@cofc.edu).

Finally, the Broker/Facilitator for the northeastern states (MI, OH, WV, PA, NJ, NY, CT, RI MA, VT, NH, and ME) is Ohio Aerospace Institute in Cleveland, OH. The point of contact is Larry Cooper (513-245-9897; email: OSSBroker@oai.org).

One more item in closing: In my additional role as Press Officer for the DPS, Larry Lebofsky (DPS Education Officer) and I would like to ask each of you to spend a few minutes between now and the end of September to answer a few questions about your present involvement in EPO and your EPO plans for the future. This will help us to better serve you. The questionnaire will be distributed via the DPS Mail Exploder. If you indicate a willingness to be a resource to formal and informal educators in your region, we could (with your specific permission) provide your name and information to the relevant OSS Broker/Facilitator. It is also our intent to summarize general results of the questionnaire at the October DPS Meeting, where (of course) identity of respondents will be kept confidential. Correspondence relative to the questionnaire should be sent to Ellis.D.Miner@jpl.nasa.gov. If you desire to talk to me by phone relative to this or other EPO items, feel free to do so at (818) 354-4450.

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Mars Global Surveyor view of gullies in the Gorgonum Chaos region shows evidence of liquid water in Mars' recent past. NASA/JPL/MSSS